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Note : Remove "Table of Content" before including in CP Book

Each Course Plan shall be printed and made into a book with cover page

Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

18CS44 :MICRO CONTROLLER AND EMBEDDED SYSTEMS

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	IS
Year / Semester :	2/4	Academic Year:	2019-20
CourseTitle:	MICROCONTROLLER AND EMBEDDED SYSTEMS	Course Code:	18CS44
Credit / L-T-P:	4/ 4-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	40	SEE Marks:	80Marks
CIA Marks:	30	Assignment	5
Course Plan Author:	Vinay Kumar B C	Sign	Dt:
Checked By:		Sign	Dt:

2. Course Content

Module	Module Content	Teaching Hours	Module Concepts	Blooms Level
1	Microprocessors versus Microcontrollers, ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software. ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table , Core Extensions	08	ARM BASICS	L1,L2
2	Introduction to the ARM Instruction Set : Data Processing Instructions , Programme Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants ARM programming using Assembly language: Writing Assembly code, Profiling and cycle counting, instruction scheduling, Register Allocation, Conditional Execution, Looping Constructs	08	ARM INSTRUCTION SET	L1,L2
3	Embedded System Components: Embedded Vs General computing system, History of embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems Core of an Embedded System including all types of processor/controller, Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components.	08	EMBEDDED SYSTEM BASICS	L1,L2
4	Embedded System Design Concepts: Characteristics and Quality Attributes of Embedded Systems, Operational quality attributes ,non-operational quality attributes, Embedded Systems-Application and Domain specific, Hardware Software Co-Design and Program Modelling, embedded firmware design and development	08	EMBEDDED DESIGN CONCEPT	L1,L2
5	RTOS and IDE for Embedded System Design: Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Multiprocessing and Multitasking, Task Communication (without any program), Task synchronization issues - Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment -	08	RTOS AND IDE SYSTEM DESIGN	L1,L2

	Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan.			
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3. Course Material

Module	Details	Available
1	Text books	
	1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008. 2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd Edition.	LIBRARY
2	Reference books	
	1. Raghunandan..G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication,2019 2. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005. 3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015. 4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.	LIBRARY

4. Course Prerequisites

SNo	Course Code	Course Name	Module / Topic / Description	Sem	Remarks	Blooms Level

Note: If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

B. OBE PARAMETERS

1. Course Outcomes

#	COs	Tea ch. Hou rs	Concept	Instr Method	Assessment Method	Blooms' Level
	Students should be able to					
18cs44.1	Describe the architectural features and instructions of ARM microcontroller	08	ARM ARCHITECTURE	Lecture	Viva Assignment	L2
18cs44.2	Apply the knowledge gained for Programming ARM for different applications and Interface external devices and I/O with ARM microcontroller.	08	INSTRUCTION SET OF ARM	Discuss	Viva ,Discuss Assignment	L3
18cs44.3	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.	08	HARDWARE COMPONENTS OF EMBEDDED SYSTEM	PPT	Describe Viva ,Discuss	L3
18cs44.4	Develop the hardware /software co-design and firmware design approaches.	08	EMBEDDED HARDWARE AND SOFTWARE DESIGN	Discuss	Viva Assignment	L2
18cs44.5	Demonstrate the need of real time	08	RTOS	Tutorial	Describe	L2

4. Mapping Justification

Mapping		Justification	Mapping Level
CO	PO	-	-
CO1	PO2	Knowledge required to build microprocessor based systems such as personal computers , home appliances	L2
CO1	PO5	To analyze the problems in microcontroller based system knowledge is required	L2
CO1	PO11	Knowledge is required in design of automobiles ,heavy traffic control devices, mplementation of projects requires the knowledge of architecture	L2
CO1	PO12	For managing the microcontroller based system individual require the knowledge of architecture Learning in the context of technology changes	L2
CO2	PO1	Assembly language programs are used to build system programs, device drivers .	L2
CO2	PO2	Knowledge is required to analyze the system programming	L2
CO2	PO3	For design and developing system programs knowledge of assembly language programming is required	L2
CO2	PO11	Assembly level programming is required for the development of tools compilers, editors	L3
CO3	PO3	Learning in the context of technology changes	L3
CO3	PO5	Students learn interfacing microprocessor with memory and /O devices such as keyboard, motors ,lcd and other external devices	L3
CO3	PO11	Understanding the details will help in analyzing and interpreting various components in mother board	L3
CO3	PO12	Embedded devices are used in home appliances	L3
CO4	PO1	Implementation of ARM based embedded projects requires the knowledge of ARM architecture	L4
CO4	PO2	Learning in the context of technology changes	L4
CO4	PO3	ARM processors used in mobile phones and computer hard drives.	L4
CO4	PO11	Implementation of ARM based embedded projects requires the knowledge of ARM architecture	L4
CO5	PO1	For managing and developing arm based embedded devices individual require the knowledge of ARM programming	L4
CO5	PO5	ARM programming is used in development of tools for embedded devices design	L4
CO5	PO11	Learning in the context of technology changes	L4

Note: Write justification for each CO-PO mapping.

5. Curricular Gap and Content

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					

Note: Write Gap topics from A.4 and add others also.

6. Content Beyond Syllabus

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					
6					

7					
8					
9					
10					

Note: Anything not covered above is included here.

C. COURSE ASSESSMENT

1. Course Coverage

Module #	Title	Teaching Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Introduction to ARM	08	2	-	-	1	1	4	CO1	L3
2	Introduction to the ARM Instruction Set	08	2	-	-	1	1	4	CO2	L2
3	Embedded System Components	08	-	2	-	1	1	3	CO3	L2,
4	Embedded System Design Concepts	08	-	2	-	1	1	4	CO4	L4
5	RTOS and IDE for Embedded System Design	08	-	-	4	1	1	4	CO5	L2
-	Total	40	4	4	4	5	5	19	-	-

Note: Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

2. Continuous Internal Assessment (CIA)

Evaluation	Weightage in Marks	CO	Levels
CIA Exam - 1	30	CO1, CO2,	L2, L3
CIA Exam - 2	30	CO3,CO4	L3
CIA Exam - 3	30	CO5,	L3, L4
Assignment - 1	10	CO1, CO2,	L2, L3
Assignment - 2	10	CO3,CO4	L3
Assignment - 3	10	CO5	L3, L4
Seminar - 1	-	-	-
Seminar - 2	-	-	-
Seminar - 3	-	-	-
Other Activities - define - Slip test	-	-	-
Final CIA Marks	40	-	-

Note : Blooms Level in last column shall match with A.2 above.

D1. TEACHING PLAN - 1

Module - 1

Title:	Introduction to ARM	Appr Time:	08Hrs
a	Course Outcomes	-	Blooms Level
-		-	Level
1	Describe the architectural features and instructions of ARM microcontroller		L2

b	Course Schedule	-	-
Class No	Module Content Covered	CO	Level
1	Comparison between Microprocessor and Microcontroller	CO1	L2
2	Architecture of a typical embedded device based on ARM core with a neat diagram	CO1	L2
3	Features of ARM processor	CO1	L2
4	ARM core data flow model with a neat diagram	CO1	L2
5	different processor modes of ARM processor	CO1	L2
6	registers used under various modes	CO1	L2
7	fields in Current Program Status Register(CPSR)	CO1	L2
8	the pipeline mechanism in ARM processor, exceptions/interrupts supported by ARM processor, core extensions in ARM processor	CO1	L2
c	Application Areas	CO	Level
1	Microprocessors mainly involve in controllers in personal computers, home appliances, wireless communication equipment, consumer electronic goods, calculators, accounting system, video games, industrial controllers and data acquisition systems	CO1	L2
d	Review Questions	-	-
1	Explain registers used under various modes	CO1	L2
2	Explain the various fields in Current Program Status Register(CPSR)	CO1	L2
3	Explain the pipeline mechanism in ARM processor	CO1	L2
4	Explain various exceptions/interrupts supported by ARM processor	CO1	L2
5	Explain the concept of core extensions in ARM processor	CO1	L2

Module - 2

Title:	ARM Instruction set	Appr Time:	08Hrs
a	Course Outcomes	-	Blooms Level
-		-	
1	Apply the knowledge gained for Programming ARM for different applications	CO2	L2
b	Course Schedule	-	-
Class No	Module Content Covered	CO	Level
17	MOV and MVN instructions with an example	CO2	L3
18	arithmetic instructions with examples with respect to ARM process	CO2	L3
19	multiply instructions of ARM	CO2	L3
20	swap instructions with examples with respect to ARM processor.	CO2	L3
21	load-store instructions with respect to single register transfer and multiple register transfer.	CO3	L3
22	software interrupt instructions of ARM processor.	CO2	L3
23	coprocessor instructions of ARM processor.	CO2	L3
24	1. the following instructions: i) EOR ,R0,R2, LSL #1 ii) CMP R0,R1 iii) MOV R7,R5,LSL #7 iv) LDR R0,[R1,#4] v) LSL R0,R1,R2	CO2	L3
c	Application Areas	CO	Level
1	Assembly language programs are used to build system programs Assembly language programs are used to build system device drivers Interrupt functions are required to write assembly programs	CO2	L3

d	Review Questions	-	-
12	Explain the MOV and MVN instructions with an example for each.	CO2	L3
13	Explain the arithmetic instructions with examples with respect to ARM process	CO2	L3
14	Explain multiply instructions of ARM.	CO3	L3
15	Write a note on swap instructions with examples with respect to ARM processor.	CO3	L3
16	Discuss the load-store instructions with respect to single register transfer and multiple register transfer.	CO3	L3
17	Explain software interrupt instructions of ARM processor.	CO3	L3
	Explain coprocessor instructions of ARM processor.		
e	Experiences	-	-

E1. CIA EXAM – 1

a. Model Question Paper - 1

CrsCode:	18CS44	Sem:	IV	Marks:	30	Time:	75minutes	
Course:	Internet of Things							
-	-	Note: Answer any 3 questions, each carry equal marks.				Marks	CO	Level
		MODULE-1(15 marks)						
1	a	Explain the Architecture of a typical embedded device based on ARM core with a neat diagram				15	CO1	L2
	b	Explain the various fields in Current Program Status Register(CPSR)					CO1	L2
2	a	Explain the design rules of RISC and ARM design.				15	CO1	L2
	b	Explain various exceptions/interrupts supported by ARM processor.					CO1	L2
3	a	Write a note on swap instructions with examples with respect to ARM processor.				15	CO2	L2
	b	Explain the MOV and MVN instructions with an example for each.					CO2	L2
4	a	1. Explain the following instructions: i) EOR ,R0,R2, LSL #1 ii) CMP R0,R1 iii) MOV R7,R5,LSL #7 iv) LDR R0,[R1,#4] v) LSL R0,R1,R2				15	CO2	L2
	b	Explain multiply instructions of ARM.					CO2	L2

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions								
CrsCode:	18CS44	Sem:	IV	Marks:	30	Time:	75 minutes	
Course:	Internet of Things							
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.								
SNo	USN	Assignment Description				Marks	CO	Level
1		Give the Comparison between Microprocessor and Microcontroller				10	CO1	L2
2		Give the comparison between RISC and CISC.				10	CO1	L3

3	Describe the features of ARM processor	10	CO1	L3
4	Explain different processor modes of ARM processor	10	CO1	L3
5	Explain the various fields in Current Program Status Register(CPSR)	10	CO1	L3
6	Explain the pipeline mechanism in ARM processor	10	CO1	L3
7	Explain the MOV and MVN instructions with an example for each.	10	CO2	L3
8	Write a note on swap instructions with examples with respect to ARM processor.	10	CO2	L3
9	Discuss the load-store instructions with respect to single register transfer and multiple register transfer.	10	CO2	L3
10	Explain software interrupt instructions of ARM processor	10	CO2	L3
11	Explain coprocessor instructions of ARM processor	10	CO2	L3
12	Explain multiply instructions of ARM.	10	CO2	L3
13	Explain the following instructions: i) EOR ,R0,R2, LSL #1 ii) CMP R0,R1 iii) MOV R7,R5,LSL #7 iv) LDR R0,[R1,#4] v) LSL R0,R1,R2	10	CO2	L3

D2. TEACHING PLAN - 2

Module - 3

Title:	IoT Network Layer	Appr Time:	08Hrs
a	Course Outcomes	-	Blooms Level
-	The student should be able to:	-	
1	Interface external devices and I/O with ARM microcontroller. Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system	CO3	L3
b	Course Schedule		
Class No	Module Content Covered	CO3	Level
1	Embedded Vs General computing system,	CO3	L3
2	History of embedded systems, Classification of Embedded systems,	CO3	L3
3	Major applications areas of embedded systems,	CO3	L3
4	Core of an Embedded System including all types of processor/controller	CO3	L3
5	Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Push button switch	CO3	L3
6	Communication Interface (onboard and external types)	CO3	L3
7	Embedded firmware	CO3	L3
8	Other system components.	CO3	L3
c	Application Areas		Level
1	Embedded devices are used in digital camera ,home appliances Applications include Smartphones, Netbooks, eReaders,	CO3	L3

d	Review Questions	-	-
1	What is embedded systems? Differentiate between general purpose computer and an embedded system	CO3	L3
2	Give the characteristics and constraints of embedded system	CO3	L3
3	What is embedded system give one example	CO3	L3
4	Explain the design of a requirement form for the beginning of project	CO3	L3
5	What is sensor ? List sensor specification .explain different types of sensors	CO3	L3
6	Compare the RAM and ROM	CO3	L3
7	Compare the FPGA and ASIC	CO3	L3
8	Explain the purpose of Embedded system	CO3	L3
9	Explain the classification of embedded system based on generation and based on complexity and performance	CO3	L3
10	Explain the following i)SPI ii) Opto couple	CO3	L3
e	Experiences	-	-

Module - 4

Title:	Embedded System Design Concepts	Appr Time:	08Hrs
a	Course Outcomes	-	Blooms Level
-	The student should be able to:	-	
1	Develop the hardware /software co-design and firmware design approaches.	CO4	L4
b	Course Schedule		
Class No	Module Content Covered	CO4	Level
1	Characteristics and Quality Attributes of Embedded Systems	CO4	L4
2	Operational quality attributes ,non-operational quality attributes	CO4	L4
3	Embedded Systems-Application and Domain specific	CO4	L4
4	Hardware Software Co-Design	CO4	L4
5	Hardware Software Co-Design and Program Modelling,	CO4	L4
6	embedded firmware design	CO4	L4
7	embedded firmware design and development		
8	embedded firmware design and development		
c	Application Areas	CO	Level
1.	ARM ALP programming is used in the development of embedded device software	CO4	L3
d	Review Questions		
1	Describe various quality attributes of embedded system	CO4	L4
2	Explain embedded firmware design and development	CO4	L4
3	Write short note on automotive communication buses	CO4	L4
4	Explain application specific embedded system: washing Meschine	CO4	L4
5	Explain the following :i)DFD ii)Sequential program model	CO4	L4
6	What is embedded firmware development language?explain embedded C and C language	CO4	L4
e	Experiences	-	

E2. CIA EXAM – 2

a. Model Question Paper - 2

CrsCode:	18CS44	Sem:	IV	Marks:	30	Time:	75minutes	
Course:	Internet of Things							
-	-	Note: Answer any 2 questions, each carry equal marks.				Marks	CO	Level
		Module-1(15 Marks)				15		
1	a	What is embedded systems? Differentiate between general purpose					CO3	L3

		computer and an embedded system			
	b	Compare the FPGA and ASIC		CO3	L3
		OR			
2	a	Explain the classification of embedded system based on generation and based on complexity and performance		CO3	L3
	b	Explain the following i)SPI ii) Opto couple		CO3	L3
		MODULE-2(15 marks)	15		
3	a	Describe various quality attributes of embedded system		CO5	L3
	b	Explain application specific embedded system: washing Meschine		CO5	L3
		OR			
4	a	What is embedded firmware development language? explain embedded C and C language		CO5	L3
	b	Write short note on automotive communication buses		CO5	L3

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions

CrsCode:	18CS44	Sem:	IV	Marks:	30	Time:	75 minutes
Course:	Internet of Things						

Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.

SNo	USN	Assignment Description	Marks	CO	Level
1		What is embedded systems? Differentiate between general purpose computer and an embedded system	10	CO3	L2
2		Give the characteristics and constraints of embedded system	10	CO3	L3
3		What is embedded system give one example	10	CO3	L4
4		Explain the design of a requirement form for the beginning of project	10	CO3	L3
5		What is sensor ? List sensor specification .explain different types of sensors	10	CO3	L4
6		Compare the RAM and ROM	10	CO3	L2
7		Compare the FPGA and ASIC	10	CO3	L3
8		Explain the purpose of Embedded system	10	CO3	L4
9		Explain the classification of embedded system based on generation and based on complexity and performance	10	CO3	L3
10		Explain the following i)SPI ii) Opto couple	10	CO4	L3
11		Describe various quality attributes of embedded system	10	CO4	L3
12		Explain embedded firmware design and developement	10	CO4	L3
13		Write short note on automotive communication buses	10	CO4	L4
14		Explain application specific embedded system: washing Meschine	10	CO5	L2
15		Explain the following :i)DFD ii)Sequential program model	10	CO5	L3
16		What is embedded firmware development language?explain embedded C and C language	10	CO4	L4

D3. TEACHING PLAN - 3

Module - 5

Title:	RTOS and IDE for Embedded System Design	Appr Time:	08Hrs
a	Course Outcomes	-	Blooms Level
-	The student should be able to:	-	
1	Demonstrate the need of real time operating system for embedded system applications	CO6	L4

b Course Schedule			
Class No	Module Content Covered	CO	Level
1.	Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program)	CO5	L4
2.	Thread preemption, Multiprocessing and Multitasking, Task Communication (without any program), Task synchronization issues - Racing and Dead loc	CO5	L4
3.	Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS,	CO5	L4
4	Integration and testing of Embedded hardware and firmware	CO5	L4
5	Embedded system Development Environment - Block diagram (excluding Keil),	CO5	L4
6.	Disassembler/decompiler	CO5	L4
7	simulator, emulator and debugging techniques	CO5	L4
8	target hardware debugging, boundary scan	CO5	L4
c Application Areas			
2	ARM ALP programming is used in Digital TV Servers and Networking	CO5	L4
d Review Questions			
1	What is task? Explain task state model	CO5	L4
2	What is boundary scan ? Explain	CO5	L4
3	Write note on: Multiprocessing and Multitasking	CO5	L4
4	What is process? Explain process control block	CO5	L4
5	How to chose an real time operating system?	CO5	L4
6	What is real time operating system ? Explain qualities of good RTOS		
e Experiences			
		-	-

E3. CIA EXAM – 3

a. Model Question Paper - 3

CrsCode:	18CS44	Sem:	IV	Marks:	30	Time:	75minutes	
Course:	Internet of Things							
-	-	Note: Answer any 2 questions, each carry equal marks.				Marks	CO	Level
		Module-1(15 Marks)				15		
1	a	What is task? Explain task state model					CO5	L3
	b	What is process? Explain process control block					CO5	L3
2	a	What is boundary scan ? Explain					CO5	L4
	b	Write note on: Multiprocessing and Multitasking					CO5	L4
		Module-2(15 Marks)						
3	a	How to chose an real time operating system?				15	CO5	L2
	b	What is real time operating system ? Explain qualities of good RTOS					CO5	L3
4	a	Explain socket function and RPC function with respect to RTOS				15	CO5	L3
	b	Define the following :Remote procedure call(RPC)					CO5	

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions								
CrsCode:	18CS44	Sem:	IV	Marks:	10/ 10	Time:	75 minutes	
Course:	Internet of Things							
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.								
SNo	USN	Assignment Description				Marks	CO	Level
1		What is task? Explain task state model					CO5	L4
2		What is boundary scan ? Explain					CO5	L4

3	Write note on: Multiprocessing and Multitasking		CO5	L4
4	What is process? Explain process control block		CO5	L4
5	How to chose an real time operating system?		CO5	L4
6	What is real time operating system ? Explain qualities of good RTOS		CO5	L4
7	Explain socket function and RPC function with respect to RTOS		CO5	L4
8	Define the following :Remote procedure call(RPC)		CO5	L4

F. EXAM PREPARATION

1. University Model Question Paper

Course:	MICRO CONTROLLER AND EMBEDDED SYSTEMS			Month / Year			
CrsCode:	CS501PC	Sem:	V	Marks:	60		
				Time:	180 minutes		
-	Note	Answer allFIVE full questions. All questions carry equal marks.			Marks	CO	Level

2. SEE Important Questions

Course:	MICRO CONTROLLER AND EMBEDDED SYSTEM			Month / Year	May /2018	
CrsCode:	18CS44	Sem:	04	Marks:	60	
				Time:	180 minutes	
	Note	Answer allFIVE full questions. All questions carry equal marks.			-	-
1	Describe the features of ARM processor			CO1	L2	
2	Explain different processor modes of ARM processor			CO1	L2	
3	Explain the various fields in Current Program Status Register(CPSR)			CO1	L2	
4	Explain the pipeline mechanism in ARM processor			CO1	L2	
5	Explain software interrupt instructions of ARM processor			CO2	L2	
6	Explain coprocessor instructions of ARM processor			CO2	L2	
7	Explain multiply instructions of ARM.			CO2	L2	
8	What is embedded systems? Diffirentiate between general purpose computer and an embedded system			CO3	L2	
09	Give the characteristics and constraints of embedded system			CO3	L2	
10	What is embedded system give one example			CO3	L2	
11	Explain embedded firmware design and developement			CO4	L2	
12	Write short note on automotive communication buses			CO4	L2	
13	Explain application specific embedded system: washing Meschine			CO4	L2	
14	What is boundary scan ? Explain			CO5	L2	
15	Write note on: Multiprocessing and Multitasking			CO5	L2	
16	What is process? Explain process control block			CO5	L2	